

REMARKS

The disclosure had been objected to for reciting "first cathode" on page 13 rather than "first electrode." An appropriate correction has been made.

The Examiner's comment regarding incorporation of essential material is noted. The Examiner did not identify any portion of the specification that was said to recite such subject matter and applicants, accordingly, seek clarification. If the Examiner is referring to the discussion at page 42, second paragraph under "(ii)," applicants respectfully submit that this mention is not improper because the sentence specifically describes the nature of the semiconductor layer.

The rejection of claims 1 and 2 under the second paragraph of 35 USC 102 for lack of antecedent basis with respect to certain items is noted. Those claims, as well as claims 3, 4, 8 to 13 and 18 to 20, have been amended so that the claims read in proper form. Claim 16 has been canceled. New claims 21 to 23 have been added. Claim 21 specifies that the organic light emitting medium is not found between the second electrode and the semiconductor layer; claim 22 is a method claim and new claim 23 specifies that the

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second electrode is located outside an area to both the first electrode and the organic light-emitting medium. Applicants respectfully submit that the features of claims such as claims 9 and 13 are to be given patentable weight as those claims now read and it is not required to express those features in "means" form.

Enclosed herewith is a Request for Approval of Drawing Change designating Figs. 13 and 14 as prior art.

The rejection of claims 1 to 20 under 35 USC 103 as unpatentable over WO '447 in view of WO '050 is respectfully traversed.

The present invention is directed to an improvement of the system shown in prior art Fig. 14. There an organic electroluminescence (EL) element has an organic light-emitting medium 214 interposed between first and second electrodes 212, 215 and light emitted from the medium 214 is taken out through the first or second electrode 212, 215. (See the enclosed marked-up drawing of Fig. 14 showing light passing through the first and second electrodes.) Such an electrode through which light is taken out must be transparent and must be made of a monocrystal semiconductive material. The usable materials for the electrode

are limited and the production of an organic EL element with a large area is difficult; see the discussion at page 2, line 17 to page 3, line 1 of the specification directed to prior art Fig. 13.

The present invention in contrast (see the enclosed marked-up Fig. 1) calls for an organic light-emitting medium interposed between a first electrode 10 and a semiconductor layer 14 with a second electrode 16 connected to an edge section of the semiconductor layer. Where light is taken in through the semiconductor layer 14, both the first and second electrodes 10, 16 must not be transparent. Further, the second electrode 16 does not obstruct the transmittance of light at the time the light is taken out. Because the second electrode 16 can be made of a non-monocrystal material, one also is able to form a large area organic EL element; see the related discussion in the specification at page 4, lines 7 to 20.

It is asserted in the Office Action that WO '447 discloses an organic EL element having a semiconductor layer. Applicants respectfully disagree. The flattened layer 6 shown in the reference is insulative, not semiconductive; see the discussion in WO '447 at page 14 beginning at the third line from the bottom.

Even if layer 6 were semiconductive, an organic light-emitting medium layer 3 is interposed between two electrodes (2, 4,) as in the prior art embodiment of instant Fig. 13. Thus, the WO '447 organic EL element cannot provide the advantages discussed above provided by the present invention.

WO '050 is said to disclose an organic light-emitting medium interposed between a first electrode and a semiconductor layer. Such a device is shown in Figs. 10 and 11 of the reference and applicants understand from claim 17 and Table 2 at page 28 thereof that the layers 75.1 and 75.2 are semiconductive in the Fig. 10 device. Applicants also understand from claim 17 and Table 3 at page 30 that layers 81.2, 81.3, 84.1, and 84.2 are semiconductive in the Fig. 11 device. Thus, WO '050 discloses an organic light-emitting medium interposed between a first electrode 71 and semiconductor layers 75.1 and 75.2. But there is no connection of an edge section of the semiconductive layers 75.1 and 75.2 to a second electrode. Accordingly, light has to be taken out through one electrode (either the first or second electrode), which means that the electrode must be transparent and made of a monocrystal material for the reasons discussed above.

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There is no proper basis, considering the references either singly or together, to form an organic electroluminescence element having the stated relationship among the first and second electrodes, the semiconductor layer, and the organic light-emitting medium where the semiconductor layer contains a non-monocrystal material.

It is respectfully submitted that the claims patentably define over the cited art and the rejection should be withdrawn.

The Examiner is requested to telephone the undersigned if anything further is required in the case prior to allowance.

Respectfully submitted,

PARKHURST & WENDEL, L.L.P.



Charles A. Wendel
Registration No. 24,453


Date

CAW/ch

Enclosure:

Marked up Figs. 1 and 14

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PARKHURST & WENDEL, L.L.P.
1421 Prince Street, Suite 210
Alexandria, Virginia 22314-2805
Telephone: (703) 739-0220

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Referring now to Fig. 1, the first embodiment according to the present invention will be described. Fig. 1 is a cross-sectional view of an organic EL element in the first embodiment, wherein on the support substrate 15, a semiconductor layer 14 comprising non-monocrystal material, an organic light-emitting medium 12, and a cathode (first [cathode] electrode) 10 are formed successively. To the extension 18 extended in the horizontal section from the edge section 17 of the semiconductor layer 14, the anode (second electrode) 16 is electrically connected.

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1. (Amended) An organic electroluminescence element comprising an anode, a semiconductor layer, an organic light-emitting medium, and a cathode [characterized in that a] wherein the organic light-emitting medium is located between [the] a first electrode and the semiconductor layer comprising [the] a non-monocrystal material and [the] a second electrode is electrically connected to [the] an edge section of the semiconductor layer when either one of the anode or cathode is designated [to] as the first electrode and the other electrode [to] is designated as the second electrode.

2. (Amended) The organic electroluminescence element according to claim 1 wherein the second electrode is electrically connected to [the] an extended section extended in [the] a horizontal direction from the edge section of the semiconductor layer.

3. (Amended) The organic electroluminescence element according to claim 1 wherein the second [electrodes] electrode is

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electrically connected to two or more edge sections of the semiconductor layer.

4. (Amended) The organic electroluminescence element according to claim 1 wherein the second electrode is [are] made in patterns of lattices or combs.

8. (Amended) The organic electroluminescence element according to claim 1, wherein the non-monocrystal material is a conductive conjugate polymer, an oxidizing agent added polymer, a reducing agent added polymer, an oxidizing agent added low-molecular weight compound, or a reducing agent added low-molecular weight compound.

9. (Amended) The organic electroluminescence element according to claim 1 wherein [the band gap of] the semiconductor layer [is held to] has a band gap of at least 2.7 eV [or higher].

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10. (Amended) The organic electroluminescence element according to claim 1 wherein [the thickness of] the semiconductor layer has a thickness of [is held within] 1 to 700 nm.

11. (Amended) The organic electroluminescence element according to claim 1 wherein [the specific resistance of] the semiconductor layer [is held] has a specific resistance within the range of 1×10^{-3} to $1 \times 10^4 \Omega \cdot \text{cm}$.

12. (Amended) The organic electroluminescence element according to claim 1 wherein [the electric charge concentration of] the semiconductor layer [is held] has an electric charge concentration within the range of 1×10^{12} to $1 \times 10^{20} \text{ cm}^{-3}$.

13. (Amended) The organic electroluminescence element according to claim 1 wherein [the light transmittance of] the semiconductor layer [is held to] has a light transmittance of at least 10%.

Cancel claim 16 without prejudice or disclaimer.

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18. (Amended) A manufacturing method [of the] for an organic electroluminescence element including [the] an anode, a semiconductor layer, an organic light-emitting medium, and [the] a cathode, comprising

[a step for] forming [the] a second electrode,

[a step for] forming a semiconductor layer comprising a non-monocrystal material at [the] a position where the second electrode is able to be electrically connected to [the] an edge section of the semiconductor layer [using the non-monocrystal material],

[a step for] forming the organic light-emitting medium above the semiconductor layer, and

[a step for] forming [the] a first electrode above the organic light-emitting medium to interpose the organic light-emitting medium between the first electrode and the semiconductor layer,

when either one of the anode or cathode is [called] designated as the first electrode and the other electrode is designated as the second electrode.

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19. (Amended) The process for manufacturing the organic electroluminescence element according to claim 18, [wherein] further comprising including a [the] step for patterning [is included] in the step [for] of forming the second electrode.

20. (Amended) The process for manufacturing the organic electroluminescence element according to claim 18, [wherein] further comprising including [a step for] forming [the] an electric insulation film [is included for covering] to cover the second electrode, or [for forming the] to form a non-injection type semiconductor layer or a metal layer.

21. (New) The organic electroluminescence element according to claim 1 wherein the organic light-emitting medium is not found between the second electrode and the semiconductor layer.

22. (New) A manufacturing method for an organic electroluminescence element including an anode, a semiconductor layer, an organic light-emitting medium, and a cathode, comprising

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forming a second electrode,

forming the semiconductor layer comprising a non-monocrystal material at a position where the second electrode is able to be electrically connected to an extension section extending horizontally from an edge section of the semiconductor layer,

forming the organic light-emitting medium above the semiconductor layer, and

forming a first electrode above the organic light-emitting medium to interpose the organic light-emitting medium between the first electrode and the semiconductor layer,

when either one of the anode or cathode is designated as the first electrode and the other electrode is designated as the second electrode.

23. (New) The organic electroluminescence element according to claim 1 wherein the second electrode is located outside an area common to both the first electrode and the organic light-emitting medium.